UNITED STATES PATENT AND TRADEMARK OFFICE
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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES
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Ex parte ALAIN FARGUES and MANI KIMIAVI
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Appeal No. 1997-3850
Application No. 08/355,973
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ON BRIEF
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Before HAIRSTON, KRASS, and LALL, Administrative Patent Judges.

KRASS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of

claims 1, 5, 6, 10 and 11. Claims 2 through 4, 7 through 9 and

12 have been indicated by the examiner as being drawn to

allowable subject matter and are not before us on appeal.

The invention pertains to digital signal transmission

systems. More particularly, the determination of energy per

bit to noise spectral density ratio (Eb/No), a measure of

transmission quality, is made by a simple calculation of the

ratio between a number of erroneous samples and a total number

of samples, this calculated ratio being inversely proportional

to the Eb/No ratio.

Representative independent claim 1 is reproduced as
follows:

1. A process for indirectly determining the Eb/No
ratio of a digital transmission, said process being applied to
a signal having a plurality of phases made up of two data
streams in phase quadrature providing in each symbol time a
received sample whose position in the constellation is defined
by its coordinates obtained by quantizing said data streams,
which process includes the steps of:

-determining the number of erroneous samples received
during a given time period whose coordinates correspond to
those of indicative samples, the coordinates of said indicative
samples being different from those of optimal samples received
under optimal transmission conditions; and

-calculating the ratio between said number of
erroneous samples and the total number of samples received in
said time period, the calculated ratio being inversely
proportional to said Eb/No ratio.

The examiner relies on the following references:

Birchler et al. [Birchler '582]   5,440,582   Aug. 8,
1995
Birchler et al. [Birchler '590]   5,440,590   Aug. 8,
1995

Claims 1, 5, 6, 10 and 11 stand rejected under 35 U.S.C.

102(e) as anticipated by Birchler '590. However, the examiner

also relies on Birchler '582 since it is recited within

Birchler '590 and is considered to be incorporated therein by

reference.

Reference is made to the briefs and answer for the

respective positions of appellants and the examiner.

OPINION

Based on the grouping of claims by appellants, at page 6

of the principal brief, claims 5, 6 and 10 will stand or fall

with claim 1 and claim 11 will stand or fall alone.

We reverse.

A rejection under 35 U.S.C. 102, based on anticipation, is

proper only when a single prior art reference discloses,

expressly or under the principles of inherency, each and every

element of a claimed invention as well as disclosing structure

which is capable of performing the recited functional

limitations. RCA Corp. v. Applied Digital Data Sys., Inc., 730

F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir.); cert.

dismissed, 468 U.S. 1228 (1984).

Although the examiner relies on two documents to Birchler,
we consider both disclosures to constitute one merged document
as Birchler '590 incorporates by reference Birchler '582.

While the examiner is to be commended for citing and
applying very pertinent art in the outstanding rejection and
treating each of the recited claim limitations in the
explanation of the rejection, we simply do not agree that
certain claim limitations are taught, either expressly or under
the principles of inherency, by the Birchler disclosures and
the examiner has not persuaded us otherwise.

In the instant invention, a memory 61 contains the
coordinates of all samples which can be received except for
those of the optimal samples. Thus, the memory contains the
coordinates of the indicative samples. Each received sample is
compared to the contents of the memory and if the sample
received is an indicative sample, the comparator causes an
increment in erroneous sample counter 62. At the end of the
measuriing time, the content of this counter, representing the
number of erroneous samples counted, is input to a ratio
calculating means 63 which also receives the total number of
samples received from counter 64. The ratio of erroneous

samples to total samples, inversely proportional to the Eb/No
ratio, is then calculated and this value is then employed to
determine acceptable transmission signal quality.

While it is true that the memory storing the coordinates
of the samples is not part of the instant *claimed* subject
matter, claims 1 and 11 still require the received samples to
have positions in a constellation, those positions being
defined by coordinates in the constellation. The claims also
require the calculation of a ratio between the number of
erroneous samples and the total number of samples in order to
indirectly determine the Eb/No ratio of a digital transmission.

By contrast, either one of the Birchler references deals
with determining a ratio of the undesired portion (analogous to
appellants' indicative sample) of a signal to the desired
portion (analogous to appellants' optimal samples) of the
signal. While this determination also permits Birchler to
produce a signal representative of signal quality, it is
unclear to us how this signal is "inversely proportional to
said Eb/No ratio," as claimed. The examiner gives an
explanation, at page 7 of the answer, equating Birchler's
undesired component I and desired component C to the claimed

indicative and optimal samples, respectively. The examiner

attempts to show that the inverse relation, C/I, i.e., ratio of

desired components to undesired components, is equal to Eb/No.

What is not clear from the examiner's explanation is why the

desired components C, of Birchler are held to be equivalent to

Eb and why the undesired components, I, of Birchler are held to

be the equivalent to No. The examiner does not explain and, it

should be noted, appellants do not contradict this analysis in

their reply brief. The examiner does attach an appendix, a

section of a Digital Communications text by Bernard Sklar, to

the answer but there is no explanation in the answer as to the

purpose of this attachment. Accordingly, we have not

considered this attachment.

In any event, we do not find the examiner's rationale as

to why Birchler's ratio of I/C is inversely proportional to

Eb/No to be persuasive and fail to find, within the disclosure

of either Birchler reference, the claimed calculation of the

ratio between the number of erroneous samples and the *total*

number of samples received wherein the ratio is inversely

proportional to Eb/No.

Further, we find no mention within the Birchler references
of the claimed coordinates for the samples. While the examiner
points to Figure 1 of Birchler '582, our review of the
disclosure of that reference does not indicate a coordinate
system as claimed. Rather, the Figure 1 illustrations are
merely transmitted and received information symbol patterns.
Moreover, there is no indication within the Birchler
disclosures that the incoming samples are assigned any
coordinate location. Birchler merely averages the signals and
then uses these averages in the ratio computations whereas
appellants *count* the number of samples whose coordinates
correspond to indicative samples and keep track of the total
number of samples received during a given time period and then
use these values to calculate the ratio of erroneous samples to
total samples. Birchler does not disclose such counting
because Birchler does not keep track of erroneous samples in
the same manner.

The examiner contends that quantized samples having
corresponding coordinates "is well known" and that the
coordinates of indicative samples being different from the
coordinates of optimal samples "is well known" [answer-page 4].

With regard to the counting limitations in the claims, the

examiner contends that a receiver "inherently counts the number

of erroneous signal [sic] from the total received signal"

[answer-page 5]. While counting and coordinates, per se, may

be "well known," that is not a sufficient reason for concluding

that the instant claimed subject matter is anticipated by

Birchler. We find no teaching in either of the Birchler

references of employing a counter and a coordinate system in a

constellation as recited by instant claims 1 and 11.

Accordingly, Birchler cannot anticipate the instant claimed

invention.

The examiner's decision rejecting claims 1, 5, 6, 10 and

11 under 35 U.S.C. 102(e) is reversed.

                         REVERSED

            KENNETH W. HAIRSTON   )
            Administrative Patent Judge   )
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)
) BOARD OF PATENT
            ERROL A. KRASS   )   APPEALS
            Administrative Patent Judge   )   AND
)   INTERFERENCES
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            PARSHOTAM S. LALL   )
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